

Study Guide

For use with pages 436–441

GOAL Graph inequalities in two variables.**VOCABULARY**

A **linear inequality** in two variables, such as $2x - 3y < 6$, is the result of replacing the equal sign in a linear equation with $<$, \leq , $>$, or \geq .

An ordered pair (x, y) is a **solution of a linear inequality** if substituting the values of x and y into the inequality produces a true statement.

The **graph of a linear inequality** in two variables is the set of points in a coordinate plane that represent all the inequality's solutions.

The graph of a line in a coordinate plane divides the plane into two half-planes.

EXAMPLE 1 Checking Solutions of a Linear Inequality

Tell whether the ordered pair is a solution of $5x + 4y \geq 45$.

a. $(1, 10)$

b. $(-5, 3)$

Solutiona. Substitute 1 for x and 10 for y .

$$5x + 4y \geq 45$$

$$5(1) + 4(10) \stackrel{?}{\geq} 45$$

$$45 \geq 45$$

 $(1, 10)$ is a solution.b. Substitute -5 for x and 3 for y .

$$5x + 4y \geq 45$$

$$5(-5) + 4(3) \stackrel{?}{\geq} 45$$

$$-13 \not\geq 45$$

 $(-5, 3)$ is not a solution.**Exercises for Example 1**

Tell whether the ordered pair is a solution of $12x + 3y > 100$.

1. $(5, 14)$

2. $(3, 21)$

3. $(8, 1)$

4. $(9, 0)$

EXAMPLE 2 Graphing a Linear Inequality

Graph $y < 3x - 5$.

(1) Draw the boundary line $y = 3x - 5$. The inequality symbol is $<$, so use a dashed line.

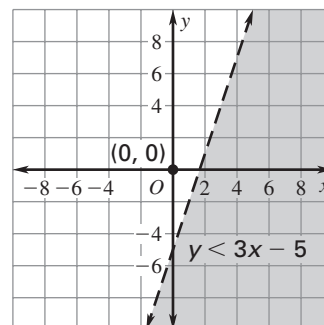
(2) Test the point $(0, 0)$ in the inequality.

$$y < 3x - 5$$

$$0 \stackrel{?}{<} 3(0) - 5$$

$$0 \not< -5$$

(3) Because $(0, 0)$ is not a solution, shade the half-plane that does *not* contain $(0, 0)$.



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EXAMPLE 3 Graphing Inequalities with One Variable

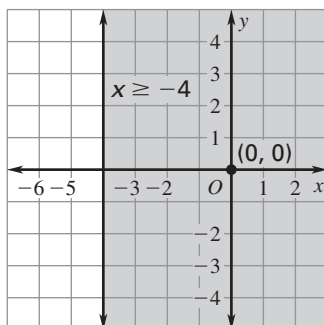
Graph $x \geq -4$ and $y < -6$ in a coordinate plane.

- a. Graph $x = -4$ using a solid line. Use $(0, 0)$ as a test point.

$$x \geq -4$$

$$0 \geq -4 \checkmark$$

Shade the half-plane that contains $(0, 0)$.

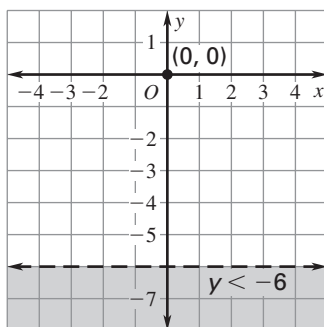


- b. Graph $y = -6$ using a dashed line. Use $(0, 0)$ as a test point.

$$y < -6$$

$$0 \not< -6$$

Shade the half-plane that does *not* contain $(0, 0)$.



Exercises for Examples 2 and 3

Graph the inequality in a coordinate plane.

5. $y \geq 4$

6. $y \leq -4x + 1$

7. $5x - y > 2$

8. $x < -3$